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REPORT
ON A
SANITARY SURVEY
OF THE
BAYFIELD RIVER
IN THE AREA
OF THE
HAMLET OF EGMONDVILLE

District Engineers Branch
Division of Sanitary Engineering

1970

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SANITARY SURVEY OF THE BAYFIELD RIVER IN THE
AREA OF THE HAMLET OF EGMONDVILLE - 1970

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REPORT
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IN THE AREA
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HAMLET OF EGMONDVILLE

DISTRICT ENGINEERS BRANCH
DIVISION OF SANITARY ENGINEERING

1970

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1. The Corporation of the Township of Tuckersmith,
R.R.#4,
SEAFORTH, Ontario.

Attn: Mr. J.I. McIntosh, Clerk-Treasurer

2. The Corporation of the Town of Seaforth,
Box 610,
SEAFORTH, Ontario.

Attn: Mr. E.M. Williams, Clerk-Treasurer

3. Dr. G. Mills,
(Acting) Medical Officer of Health,
Huron County Health Unit,
GODERICH, Ontario.

4. J.M. Timko, District Engineer #1

5. P.G. Cockburn - Project Development File

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i) Introduction

A water pollution survey of the Bayfield River in the vicinity of the Hamlet of Egmondville was conducted in an effort to locate and evaluate all existing sources of pollution. Reports of extensive growths of algae in the Bayfield River downstream from Egmondville led to this preliminary pollution survey on October 21 and November 11, 1970. Such surveys are performed routinely and upon request, by the OWRC's Division of Sanitary Engineering.

ii) Scope of Survey

The survey was confined to the Bayfield River and its tributaries in the area bounded between the second concession west and the first concession east of County Road 12. The survey also included a portion of Silver Creek as far north as the storm sewer outlet at Birch Street in Seaforth.

The survey involved the examination and sampling of the Bayfield River, local watercourses, and sewer outfalls; interviews with municipal officials, and a review of Commission files on water supply and waste treatment.

The information and results of the analyses of samples obtained during the survey are evaluated to determine what measures are required to prevent or eliminate water pollution.

iii) Description of Area

The Hamlet of Egmondville is situated on County Road 12 in the Township of Tuckersmith; its northern limit

forming a common boundary with the Town of Seaforth. The population of Egmondville is approximately 460.

The area is drained mainly by a system of storm sewers discharging to the Bayfield River.

Topography in the area could best be described as rolling to hilly. The subsoil conditions are predominantly hard clay tills and are not well suited for sub-surface sewage disposal systems.

iv) Existing Services

Water Supply

The Hamlet of Egmondville is serviced by two drilled wells. Storage is provided by a 10,250 Imperial gallon underground reservoir and two pressure tanks with capacities of 300 I.G. and 500 US gallons, respectively.

The system serves an estimated population of 460 through 101 service connections.

Waste Disposal

Private septic tank systems are used for the disposal of domestic wastes in the Hamlet of Egmondville.

Conditions noted during the survey indicated that the septic tank systems were not functioning properly in a number of locations. There was visual evidence that the effluent from these units was, either directly or otherwise, gaining access to the storm sewers.

I PROCEDURE

The survey was carried out on October 21 and November 11, 1970. A total of 30 samples were collected from 12 locations along the Bayfield River and tributaries. The location of the sampling points are indicated on an appended map of the area which has been prepared for this report. A brief description of the sampling point locations may be found in Appendix II.

II SAMPLING ANALYSES

Analyses were conducted on samples obtained on October 21 to determine the numbers of coliform and faecal coliform bacterial present per 100 ml of sample, the biochemical oxygen demand exerted by the samples, and the total and suspended solids concentrations.

Samples collected on November 11, were also analysed to determine the concentrations of any anionic detergents present, concentrations of total phosphorus, and the nitrogen concentrations as ammonia, total kjeldahl and nitrates.

A brief explanation and the significance of the laboratory analyses may be found in Appendix I.

Tabled in Appendix III are the analyses results of the samples collected during the survey.

III FINDINGS

Reference is directed to Appendix III.

The Bayfield River to the west of Egmondville was sampled (BF.31.2) and while the presence of faecal coliform organisms was confirmed, only minor deterioration was evident.

A small tributary to the Bayfield, entering to the southeast of Egmondville was sampled and showed high total and faecal coliform organism counts which may be attributed to agricultural run-off in the area.

Silver Creek, which joins the Bayfield River to the immediate east of Egmondville, was noted to be bacteriologically impaired (stations BFS.30.0 and BFS.29.4). Effluent from the Seaforth sewage treatment plant is received by Silver Creek upstream of these sample points.

In addition to this pollutional loading, Silver Creek also receives sanitary wastes at station W-30.5, an Egmondville storm sewer exiting downstream from the Seaforth sewage works.

Three storm sewers discharging wastes from Egmondville to the Bayfield River all were noted to be carrying sanitary wastes. Extreme faecal and total coliform counts, as well as very

high BOD concentrations and ABS concentrations, were found to be present in samples collected from storm sewer outfalls at stations W-1, W-28.8 and W-28.2.

Further downstream, a small tributary enters the Bayfield but as indicated by the sample collected from station BFT 26.5, the pollutional load due to this stream is inconsequential.

Samples collected well downstream of the Egmondville area were noted to be impaired with high total and faecal coliform counts being recorded at sampling station BF 26.0. Nutrient levels both at the above location and at BF 25.1 were in excess of the minimum concentrations necessary to promote algal growth.

IV DISCUSSION

As noted in the preceding findings, the quality of the Bayfield River tends to deteriorate over the length of the study area.

The sources of organic loading over this reach are concluded to be agricultural run-off, the Silver Creek confluence (impaired due to the Seaforth STP effluent) and

the storm sewer discharges originating in the Hamlet of Egmondville.

During the survey these storm discharges were observed to contain solid particles of sewage, to be grey in colour and to emit septic odours.

The Seaforth sewage treatment facilities are known to be a continuous source of pollution to Silver Creek and eventually the Bayfield River.

The recent high incidence of algal blooms on the Bayfield River has been correctly attributed to this inadequate facility but it is now apparent that substantial organic loading is occurring due to inadequate sewage disposal in the Hamlet of Egmondville.

With respect to correcting the Seaforth sewage works, the OWRC are developing a Provincial Sewage Works. Included in the design of the treatment works are provisions for sufficient pumping capacity to bring sewage from the Hamlet of Egmondville into the Seaforth system.

Corrective measures in the Hamlet of Egmondville are definitely in order and this remedial action may be undertaken either on an individual basis, by building adequate sub-surface

disposal systems, or by directing sewage to a communal treatment facility.

Soil characteristics of the area, consisting mainly of clay and silt, do not readily lend themselves to satisfactory sub-surface disposal systems.

It is therefore advisable that a sewage collection system be provided and that all sewage be directed to the neighbouring Seaforth sewerage system.

V CONCLUSION

As a result of this survey it is evident that a sewerage system is required to service the Hamlet of Egmondville.

Action should be initiated forthwith to cease further pollutional discharges to the Bayfield River.

VI RECOMMENDATIONS

It is recommended that the Hamlet of Egmondville develop a system of sanitary sewers and direct all such sewage to a communal treatment facility. Consideration should be directed to utilizing the Seaforth sewage treatment facilities as the treatment works.

Prepared by:.....*G.L. McCarty*.....
G.L. McCarty

APPENDIX I

EXPLANATION AND SIGNIFICANCE OF LABORATORY ANALYSES

All the laboratory tests included in this report were performed at the Ontario Water Resources Commission laboratory in Toronto.

A. BACTERIOLOGICAL EXAMINATION

The membrane filter technique is used to obtain a direct enumeration of coliform organisms. Coliform organisms are used as an indication of the presence of domestic sewage. Faecal coliform organisms, specific to the intestinal tract of warm blooded animals, are a definite indication of the presence of sewage.

The results of the examinations are reported as "M.F. Coliform Count per 100 ml".

The Commission's objective for stream sanitation is a coliform density of not greater than 2,400 organisms per 100 ml.

B. SANITARY CHEMICAL ANALYSES

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (ppm), and is an indication of the amount of oxygen required for the stablization of decomposable

organic matter in the water. The completion of the laboratory test requires five days, under the controlled incubation temperature of 20°C.

The Commission's objective for stream water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million, is the sum of the values for the suspended and the dissolved matter in the water. The concentration of suspended solids is generally the most significant of the solids analyses with regard to surface water quality. The effects of suspended solids in water are reflected in difficulties associated with water purification, decomposition in streams, and injury to the habitat of fish.

Anionic Detergents as ABS

The alkyl benzene sulfonate portion of the anionic detergents is reported in ppm. The test is generally employed to indicate the presence of illegal discharge of waste water to storm drains.

Nitrogen

Ammonia Nitrogen or sometimes called free ammonia is the insoluble product in the decomposition of nitrogenous organic matter. It is also formed when nitrates and nitrites

are reduced to ammonia either biologically or chemically. Some small amounts of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: low 0.015 to 0.03 ppm; moderate 0.03 to 0.10 ppm; high 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia Nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrate Nitrogen is the end product of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

The following ranges in concentrations may be used as a guide: low less than 0.1 ppm; moderate 0.1 to 1.0 ppm; high greater than 1.0 ppm.

Phosphorus

Phosphorus is a major element of municipal sewage as a result of the utilization of synthetic detergents. To a

certain extent phosphorus is a highly desirable element in maintaining a proper balance between plant and animal life in water. However, excessive and prolonged discharges will upset this balance and create and overabundance of algae, weeds and nuisance organisms. Excessive growths of algae have been found developing in lakes when the average concentration of inorganic phosphorus was over 0.01 ppm.

APPENDIX II

LOCATION OF SAMPLING POINTS

<u>MILEAGE POINT</u>	<u>DESCRIPTION OF LOCATION</u>
BF-25.1	Bayfield River at Bridge dividing farms of Broadfoot and McLean.
BF-26.0	Bayfield River at Bridge north of farm of Forrest.
BFT-26.5	Tributary of Bayfield River.
W-28.2	Storm sewer outlet into Bayfield River serving western section of Egmondville.
BF-28.8	Bayfield River at Bridge Hwy. #12 Egmondville.
W-28.8	Storm sewer outlet into Bayfield River at Bridge Hwy. #12 Egmondville.
W-1-W	Catch basin on the north-west corner of Hwy. #12 & Front Street.
BFS-29.4	Bridge over Silver Creek east of Egmondville on Front Street Road.
BFS-30.0	Bridge over Silver Creek on the lane leading to the municipal dump.
W-30.5	Storm sewer outlet at Birch Street into an open ditch to Silver Creek serving the Town of Seaforth.
BF-31.2	Bridge over Bayfield River on the First Concession East of Hwy. #12.
BFT-31.3	Bridge over a tributary of the Bayfield River on the First Concession East of Hwy. #12.

APPENDIX III

BAYFIELD RIVER

1970 WATER POLLUTION SURVEY

ANALYTICAL RESULTS

MILEAGE POINT	DATE	COLIFORM ORGANISMS (PER 100 ML SAMPLE)		5-DAY BOD (PPM)	TOTAL (PPM)	SOLIDS SUSPENDED (PPM)	ANIONIC DETERGENTS AS ABS (PPM)	NITROGEN AS N		NITRATE (PPM)	TOTAL PHOSPHORUS AS P (PPM)
		FAECAL	TOTAL					FREE AMMONIA (PPM)	TOTAL KJELDAHL (PPM)		
BF-25.1	OCT. 21	108	168	3.0	440	10					
	Nov. 11	540	570				0.1	0.02	0.63	2.5	0.18
BF-26.0	OCT. 21	120	408	1.8	470	10				1.0	0.25
	Nov. 11	1080	1340								
BFT-26.5	OCT. 21	4	60								
BF-26.8	Nov. 11	880,000	1,180,000	11.0	480	20	0.3	0.50	1.5	3.4	3.3
BF-23.8	OCT. 21	1100	6200								
W-23.9	OCT. 21	440,000	1,600,000	20	520	280					
	NOV. 11	400,000	2,200,000	60	690	70	3.4	14.0	23.0	.060	4.7
W-1 W	Nov. 11	300,000	1,600,000	130	760	110	4.4	11.0	14.0	<0.10	3.5
BF-29.4	OCT. 21	3500	12,600	7.5	700	15					
BFS-31.2	OCT. 21	17,000	43,000								
W-30.5	OCT. 21	35,000	200,000								
	Nov. 11	51,000	93,000	4.5	540	5	0.1	0.80	1.0	1.2	1.3
BF-31.2	OCT. 21	72	268								
BFT-31.3	OCT. 21	1800	3300								

KEY

BF - BAYFIELD RIVER

BFT - TRIBUTARY OF BAYFIELD RIVER

BFS - SILVER CREEK - TRIBUTARY OF BAYFIELD RIVER

W - STORM SEWER OUTFALL

W-1 - CATCH BASIN